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Li et al.

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(54) **METHODS FOR DETECTING ATRIAL TACHYARRHYTHMIA IN IMPLANTABLE DEVICES WITHOUT DEDICATED ATRIAL SENSING**

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CPC	A61B 5/0464 (2013.01); A61B 5/0006 (2013.01); A61B 5/0031 (2013.01); A61B 5/04012 (2013.01); A61B 5/686 (2013.01); A61N 1/3624 (2013.01); A61N 1/36592 (2013.01)
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(58) **Field of Classification Search**

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See application file for complete search history.

(56)

References Cited

U.S. PATENT DOCUMENTS

5,249,699 A	10/1993	Williams
5,755,736 A	5/1998	Gillberg et al.
5,759,196 A *	6/1998	Hess et al. 607/14
5,840,079 A	11/1998	Warman et al.
5,968,079 A	10/1999	Warman et al.

(Continued)

OTHER PUBLICATIONS

Garcia-Alberola, A., et al., "RR interval variability in irregular monomorphic ventricular tachycardia and atrial fibrillation.", *Circulation*, 93(2), (Jan. 15, 1996), 295-300.

(Continued)

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(57) **ABSTRACT**

An apparatus comprises an implantable cardiac signal sensing circuit configured to provide a sensed depolarization signal from a ventricle and a processor. The processor includes a signal analyzer module and a tachyarrhythmia discrimination module. The signal analyzer module is configured to determine a measure of stability of ventricular (V-V) depolarization intervals using the depolarization signal, and determine a rate of change of the measure of stability. The tachyarrhythmia discrimination module is configured to detect an episode of tachyarrhythmia using the depolarization signal, determine whether the detected tachyarrhythmia is indicative of atrial tachyarrhythmia using the determined rate of change, and provide the determination to a user or process.

20 Claims, 5 Drawing Sheets

